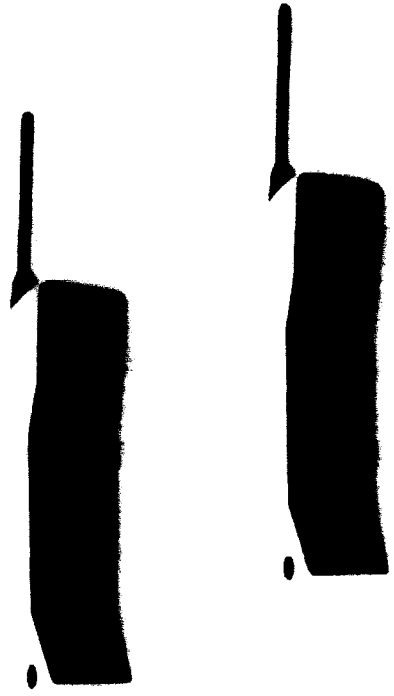
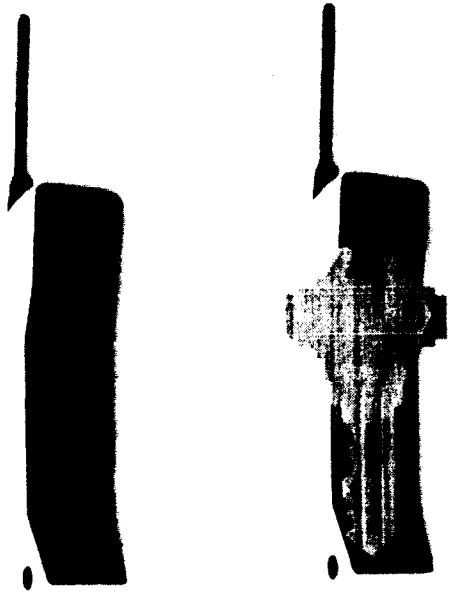
Eras of Cellular Telephony

Antiquity



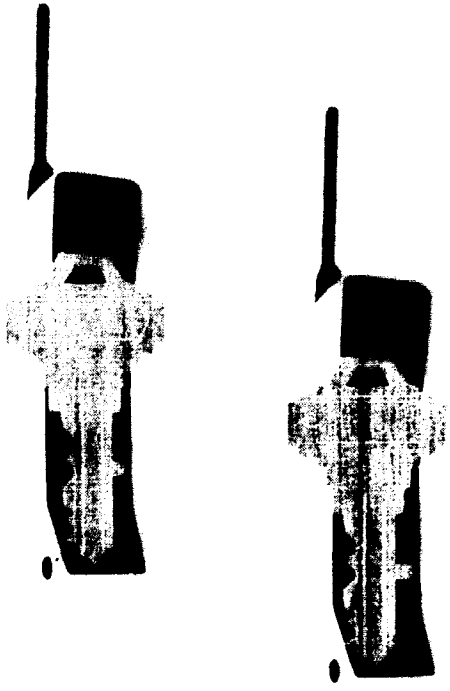
1983-1995
Identification

Sticky



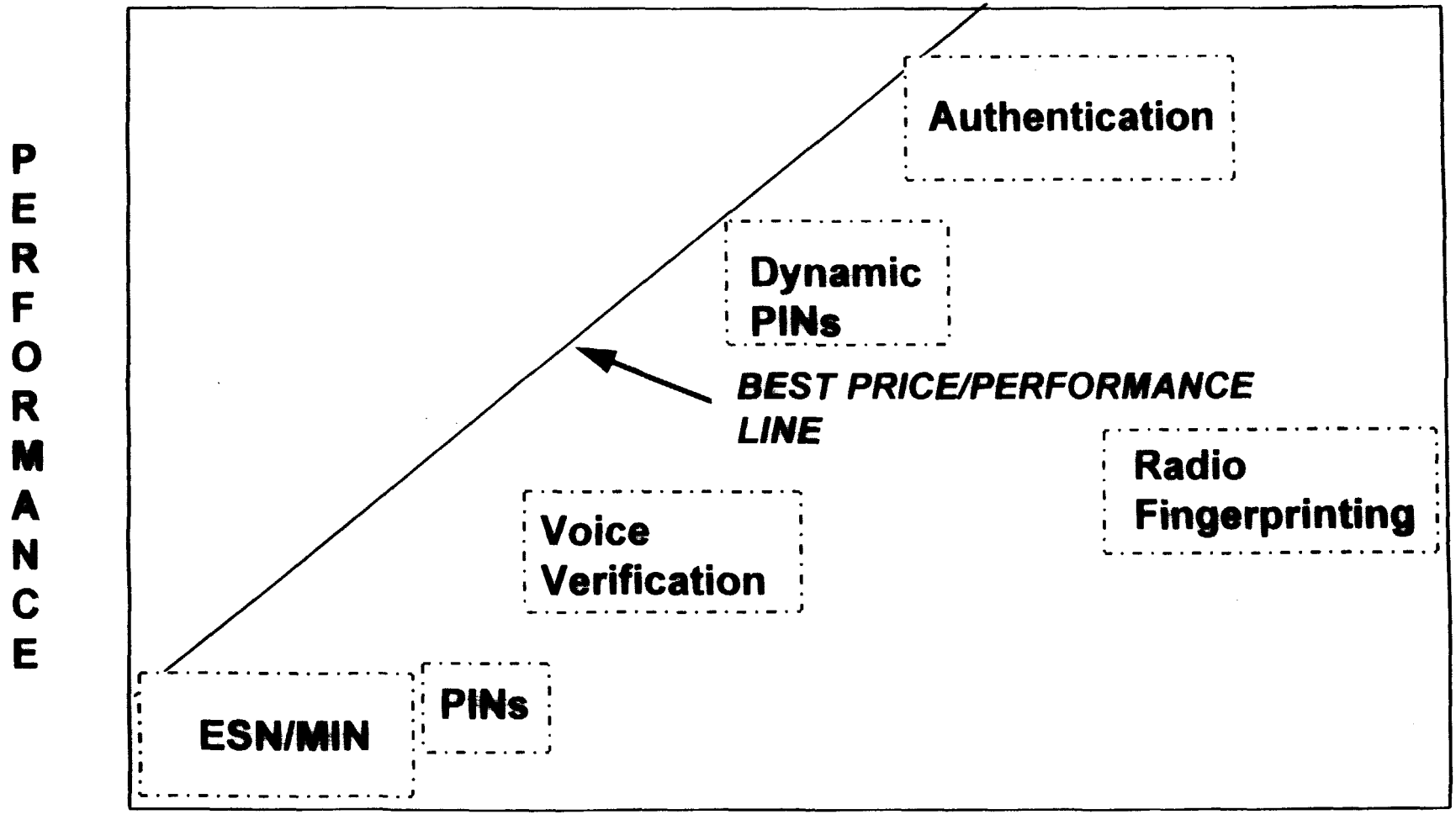
1995-200?
Hybrid
Identification and
Authentication

Ubiquity

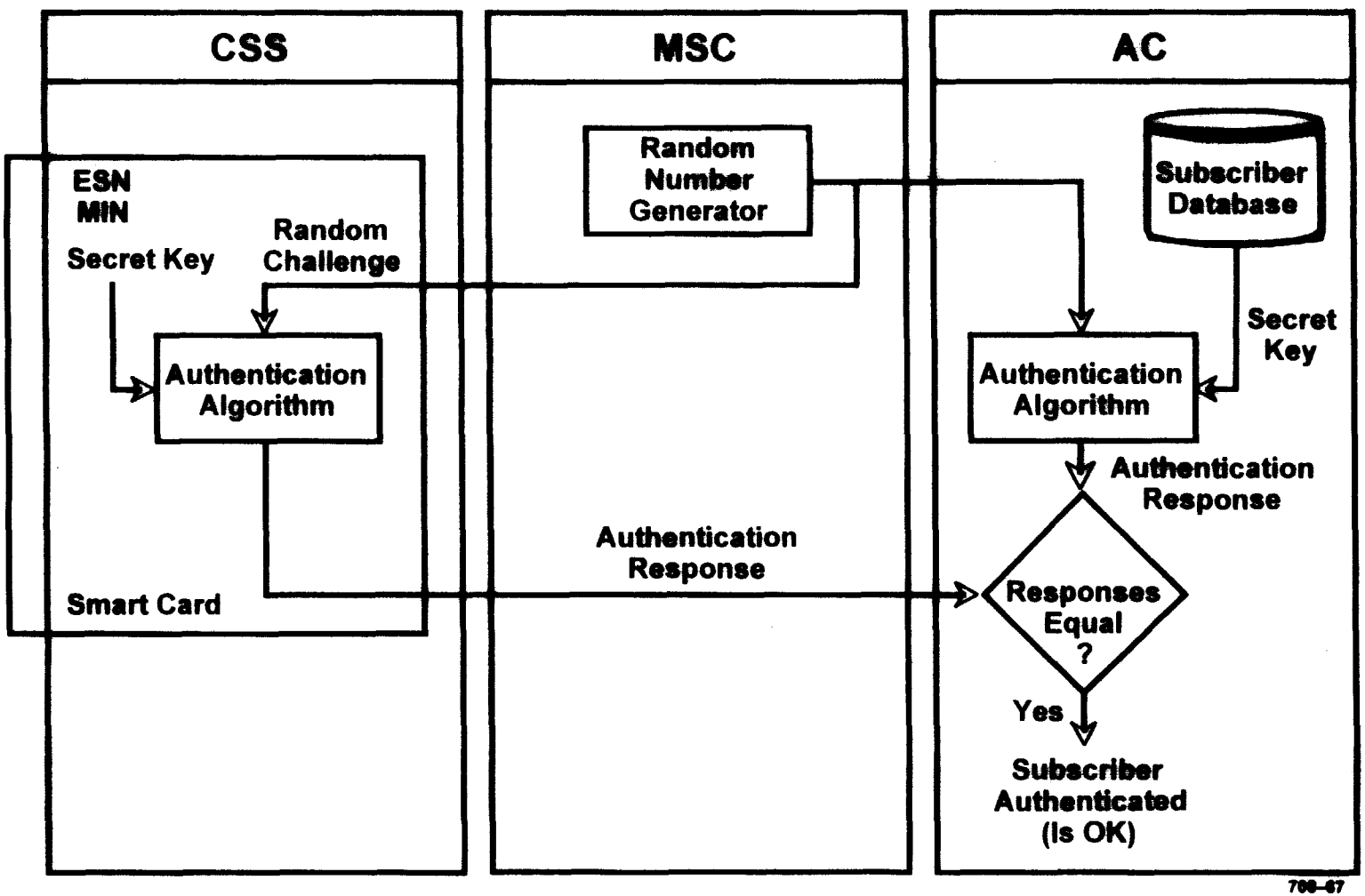


200?-20??
Authentication

Fraud Solutions Price-Performance

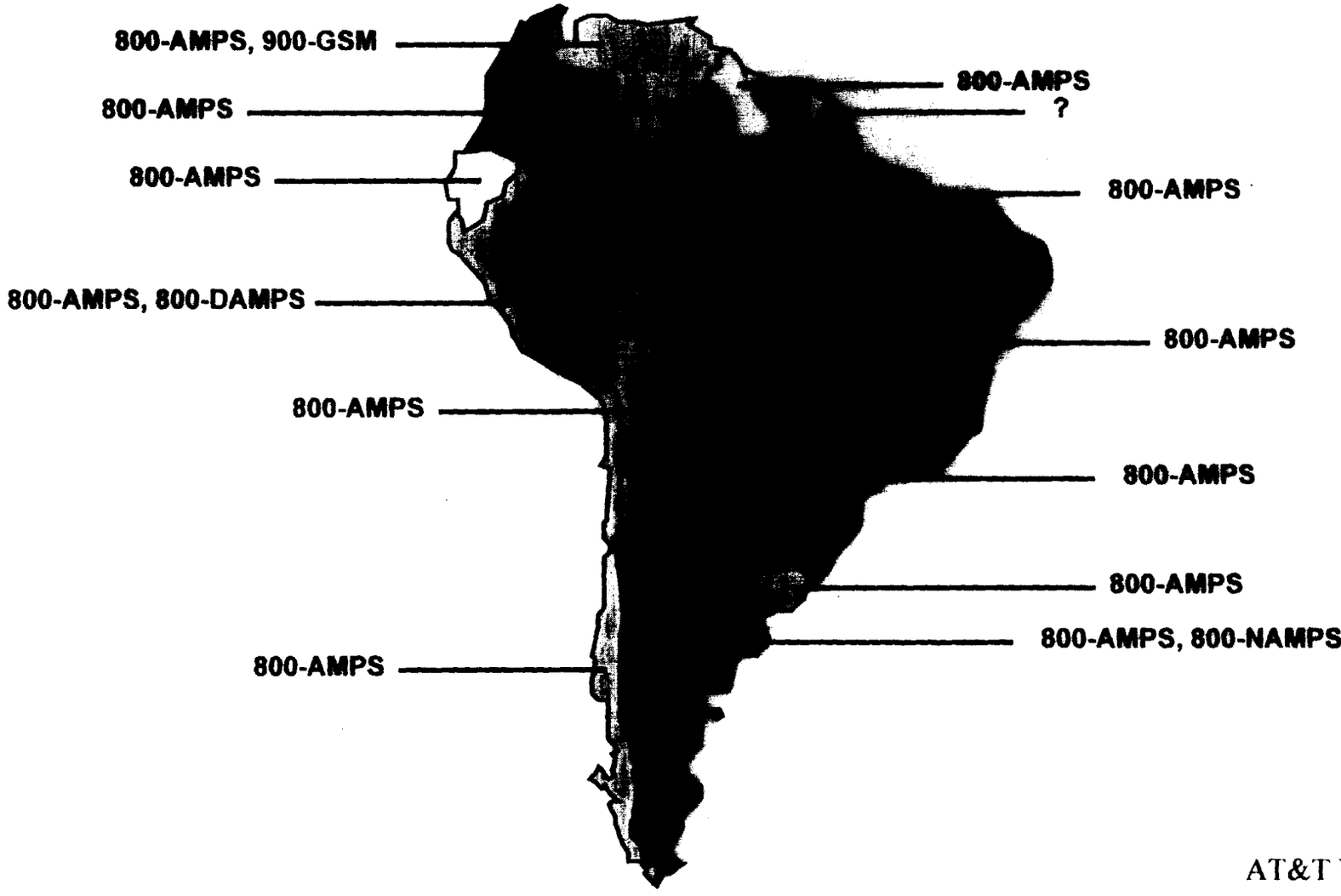


Authentication Scheme with Smart Card – GSM/PCS

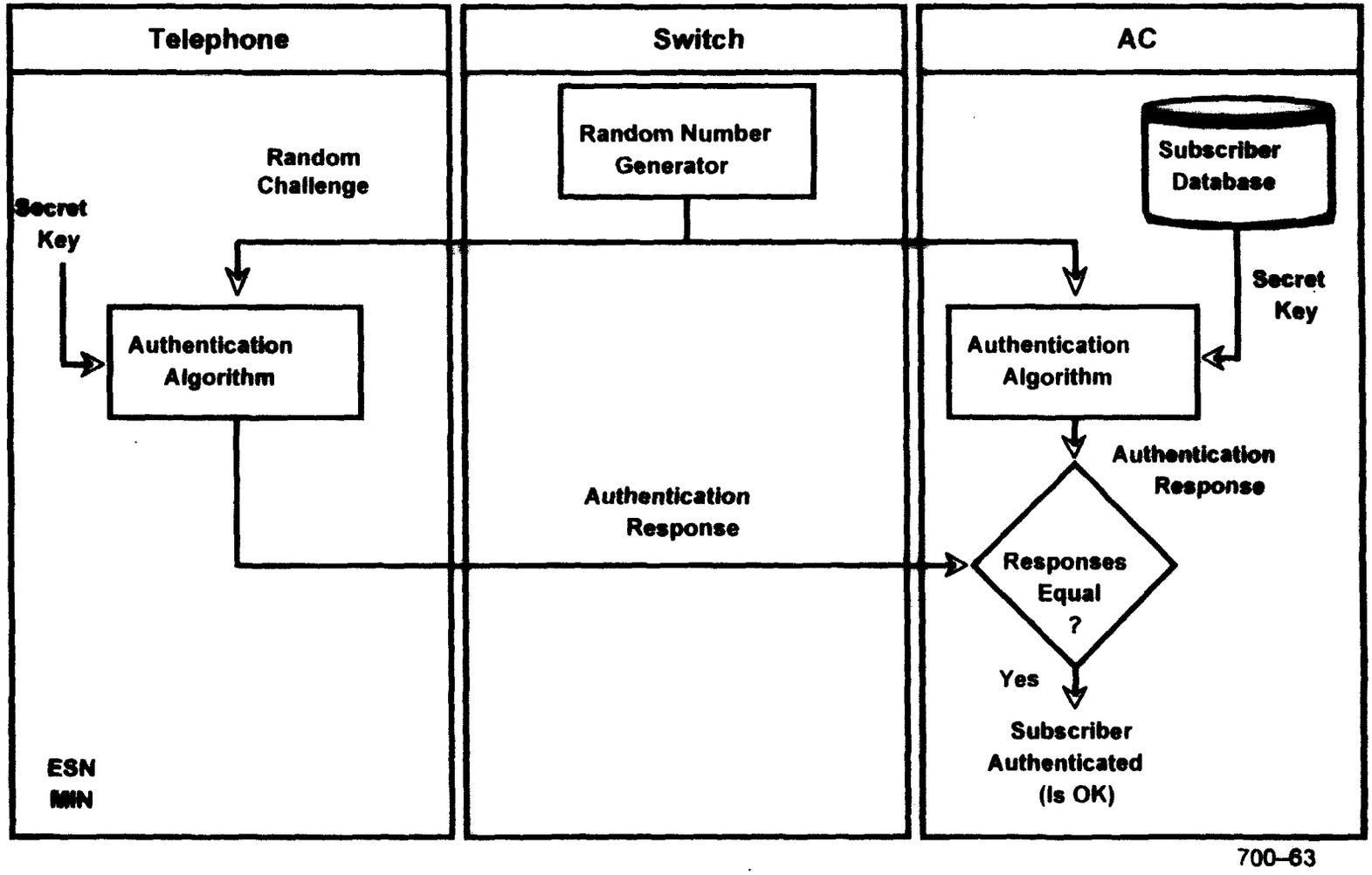


South American Countries

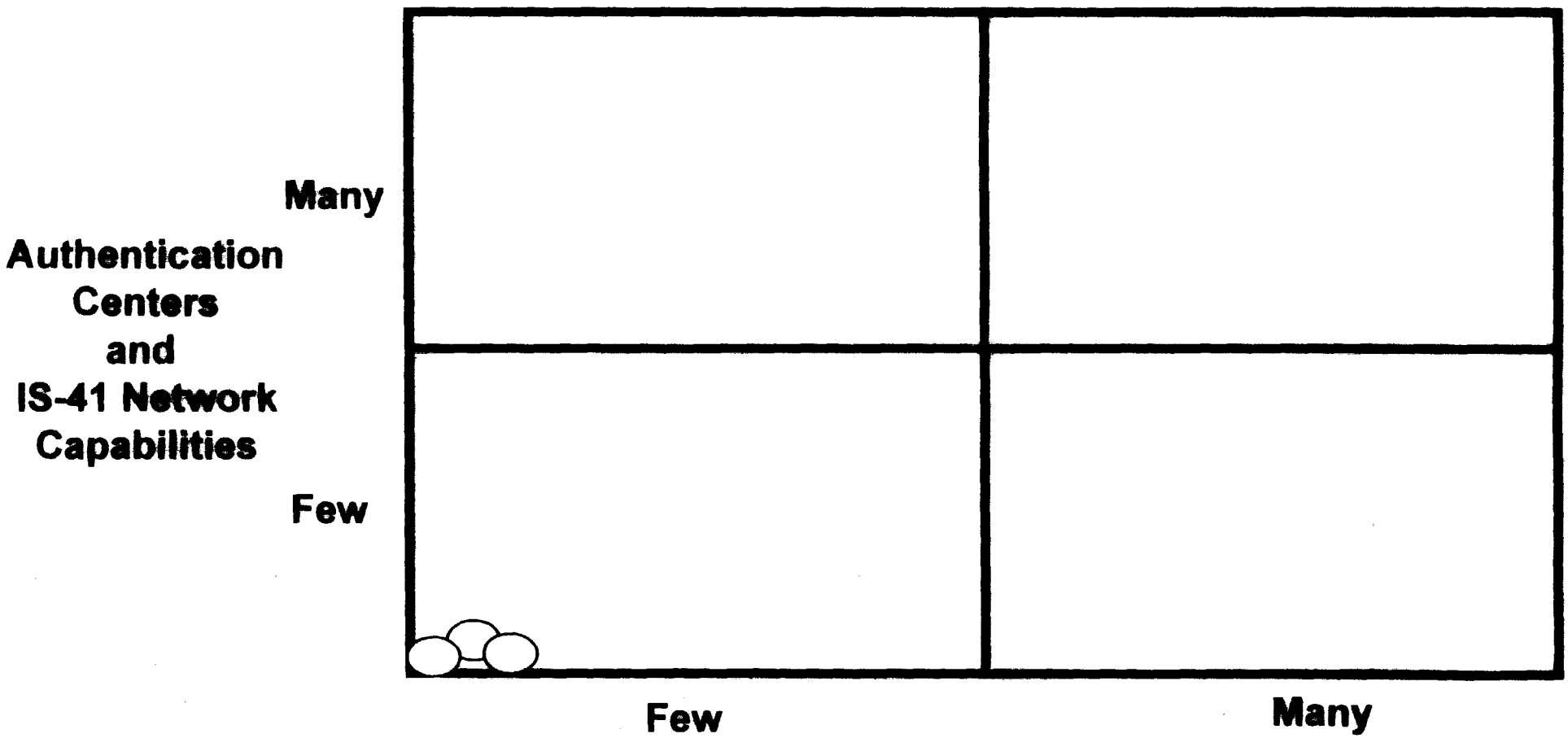
South American Countries Cellular Implementations



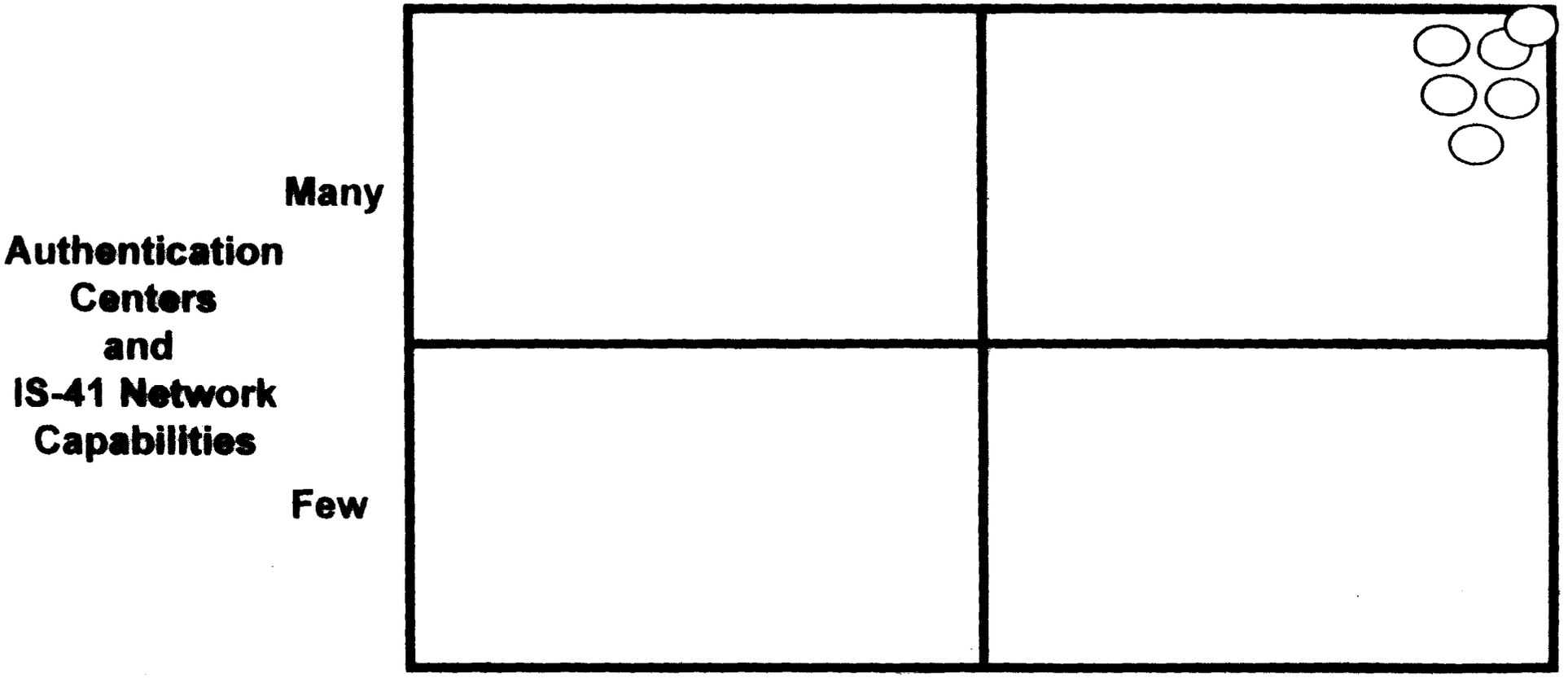
Principle of Cellular Authentication



Industry Authentication Effectiveness Map – 1995



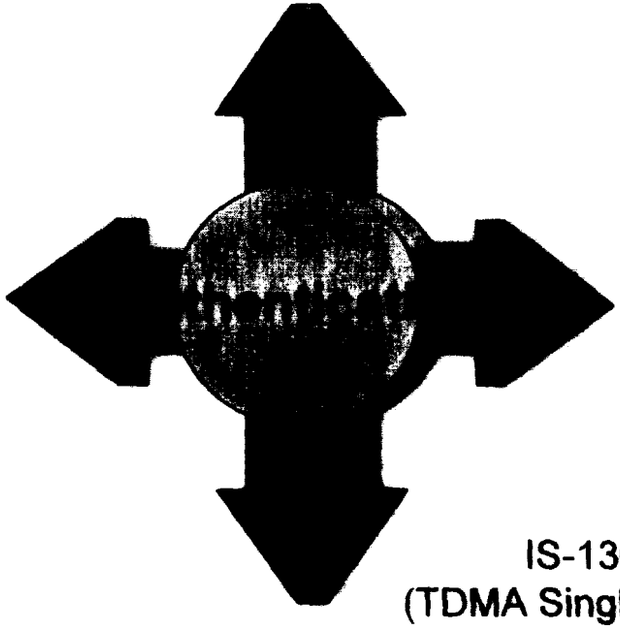
Industry Authentication Effectiveness Map - The Future



Authentication Alternatives for Cellular Telephones

IS-91
(AMPS/N-AMPS)

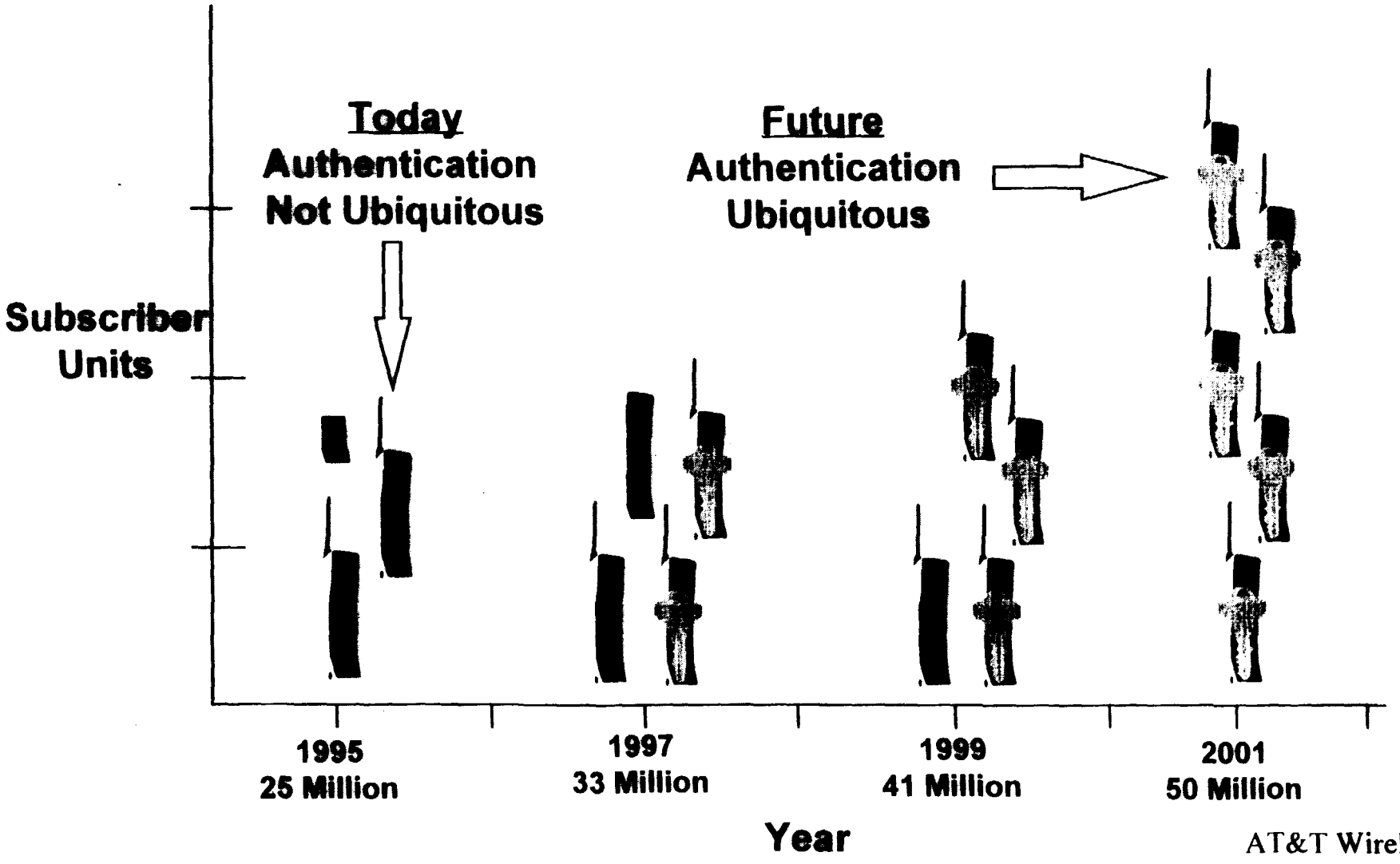
IS-95
(CDMA Dual-mode)



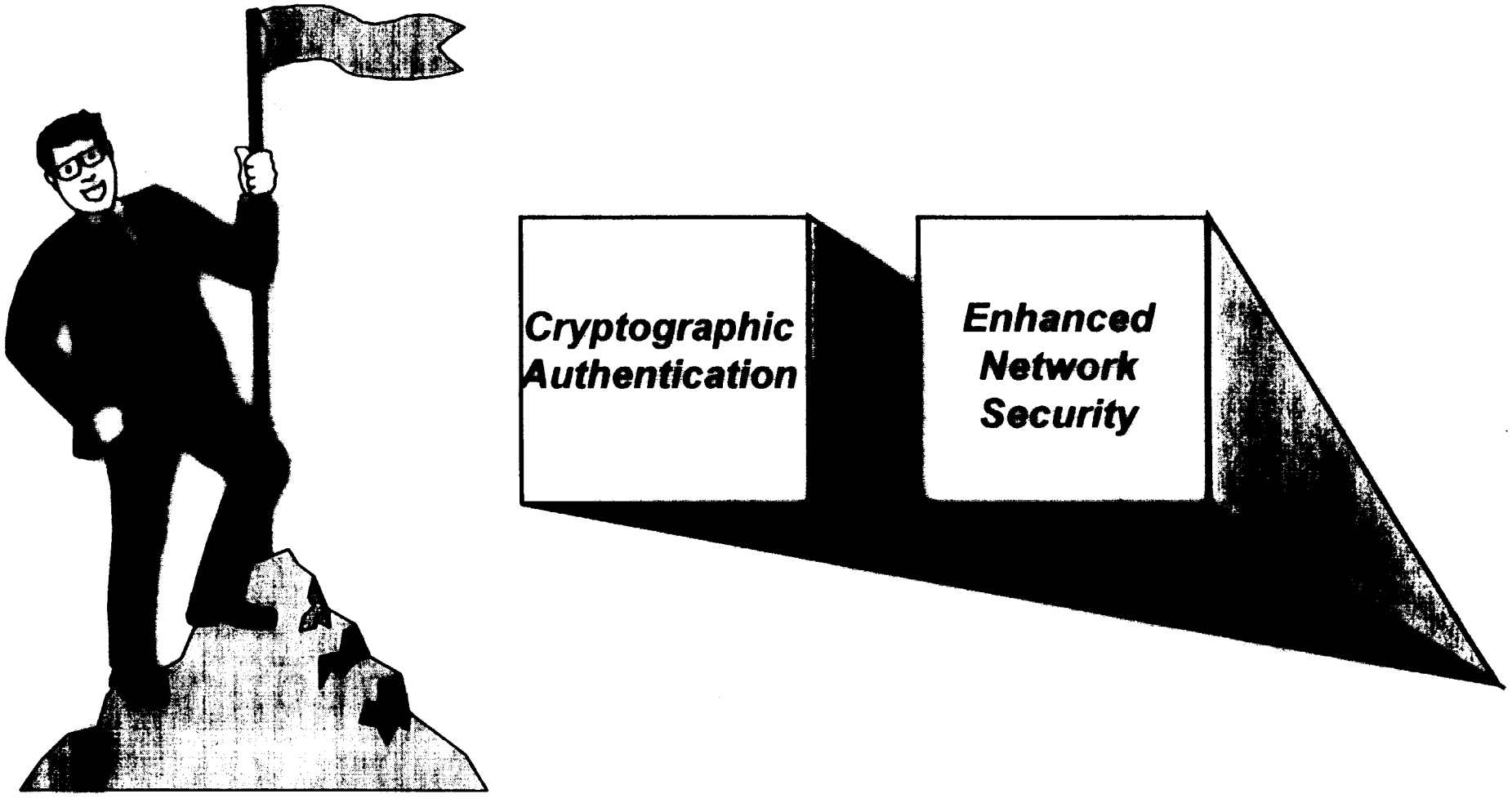
IS-54B
(TDMA Dual-mode)

IS-136
(TDMA Single-mode)
and other
all-digital

Transitioning to Authentication Capable Telephones – A Strategy

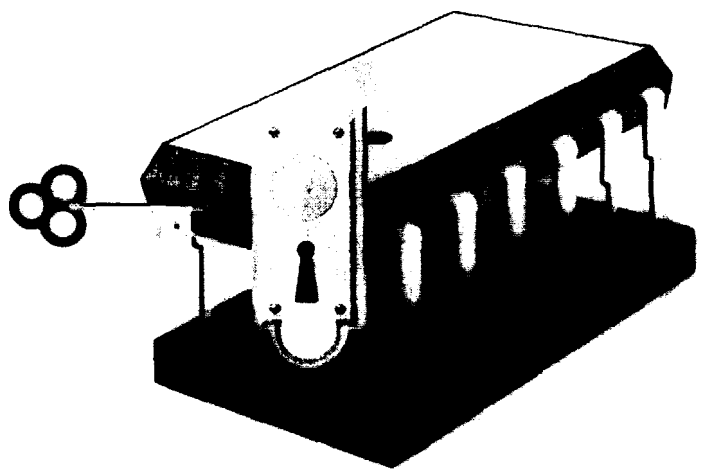


Winning the Battle

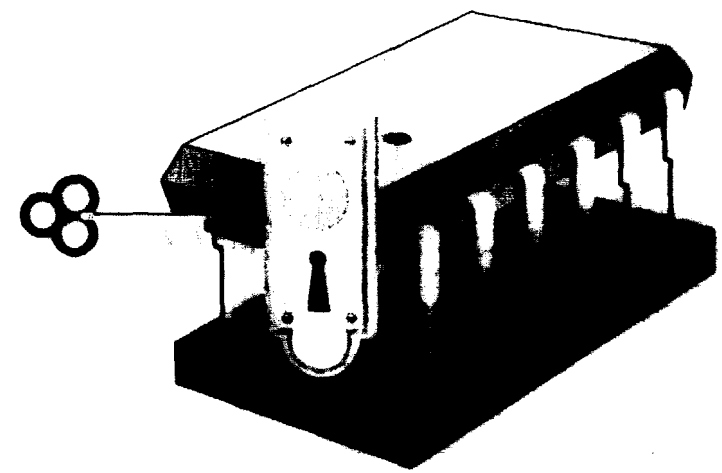


Technical Efforts to Enhance Telephone Security

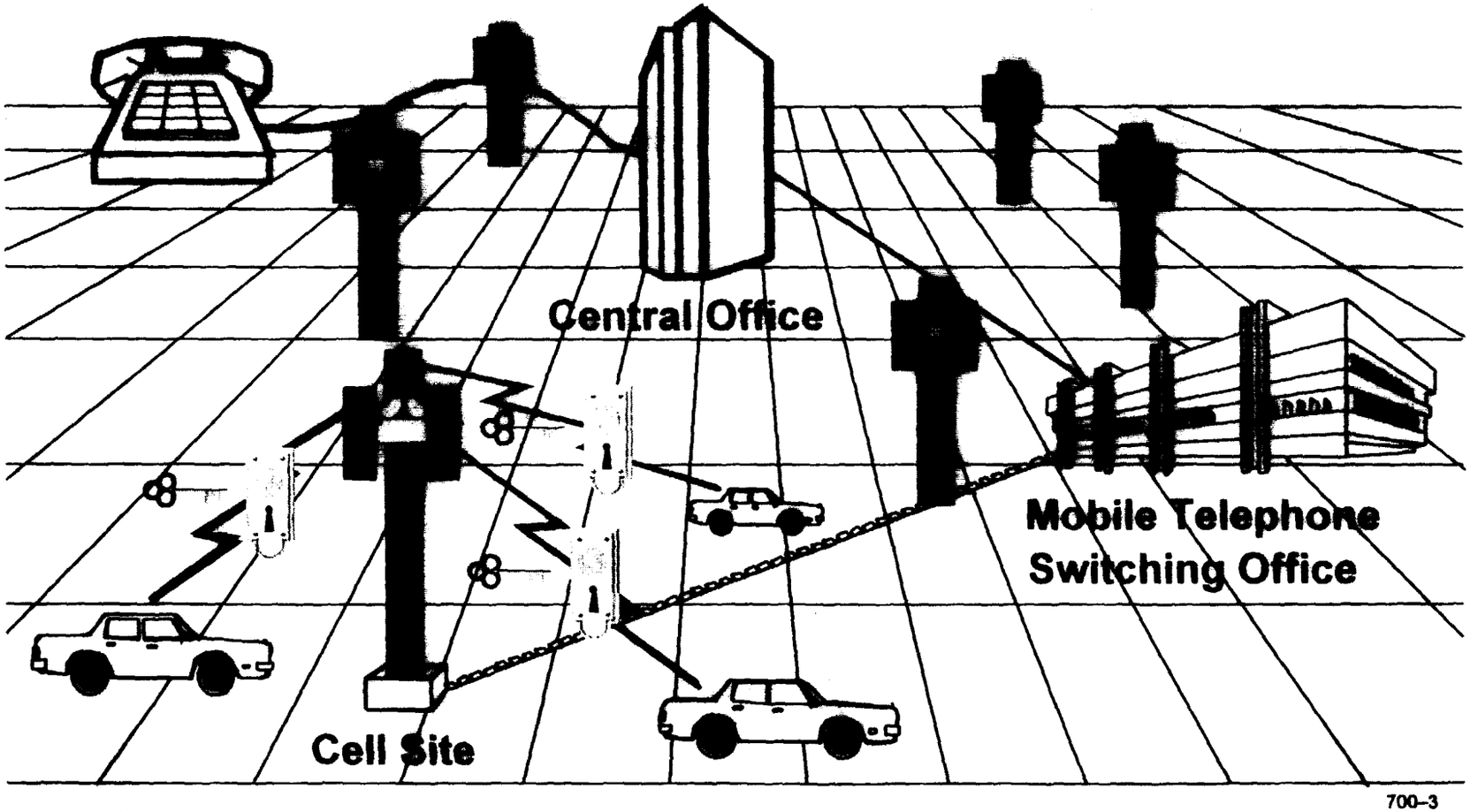
ESN Storage



Firmware Storage

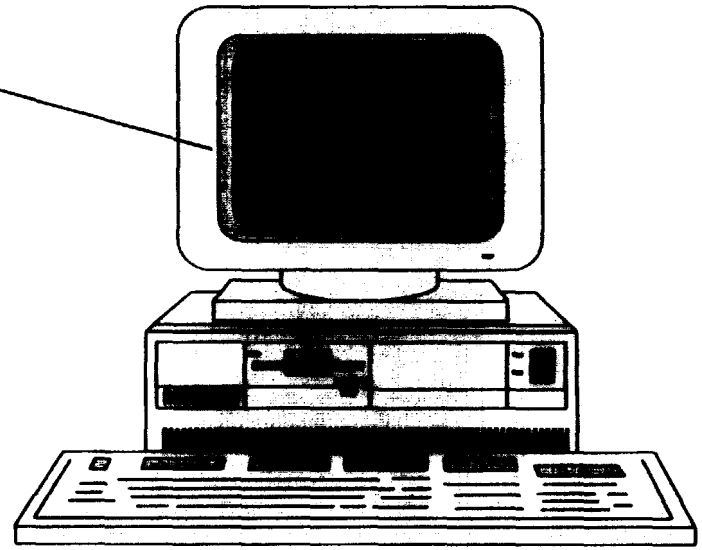


Cellular Fraud Control – Locking the Radio Path

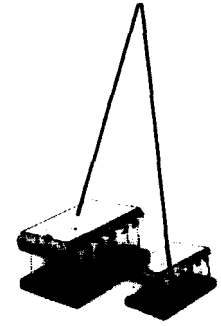


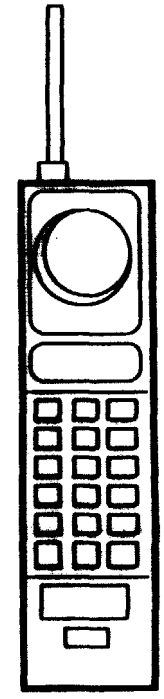
Typical Class B Counterfeiting

IBM-Compatible PC

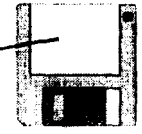


PROM or serial
EEPROM Chips

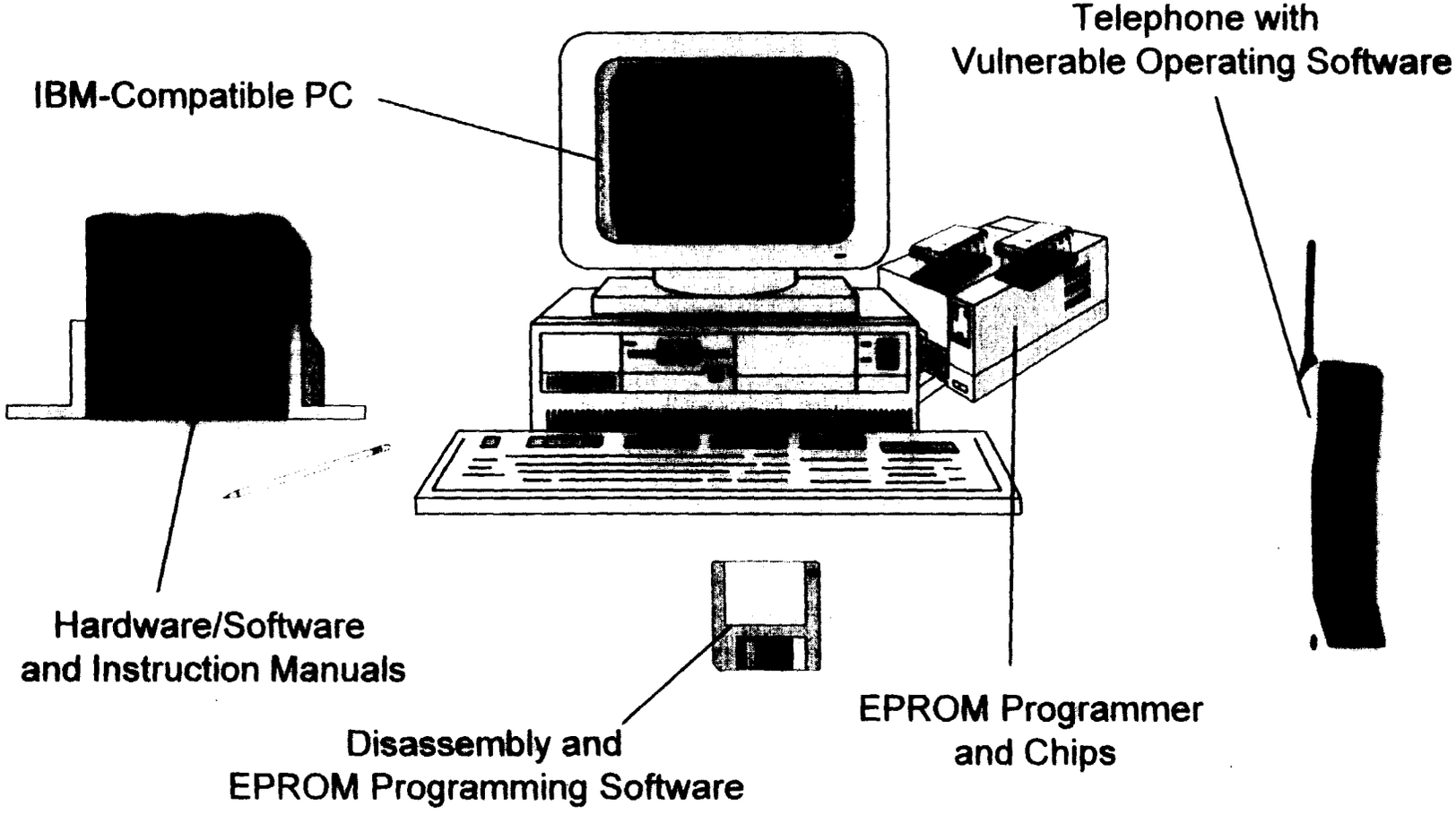


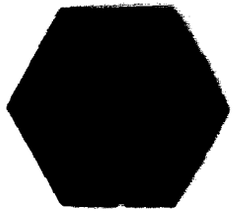


Counterfeiting Software
or EEPROM Programmer



Typical Class C Counterfeiting





Definition of Fraud

- **The unauthorized and/or illegal use of a cellular telephone or a cellular network. This includes loss of airtime and toll revenues due to misrepresentations by employees, customers, and criminals.**

Cellular Fraud in North America

Cellular Communications Era (1983-??)

Roamer Fraud Period (1985-1988)

204,000 Subscribers

2 Million Subscribers

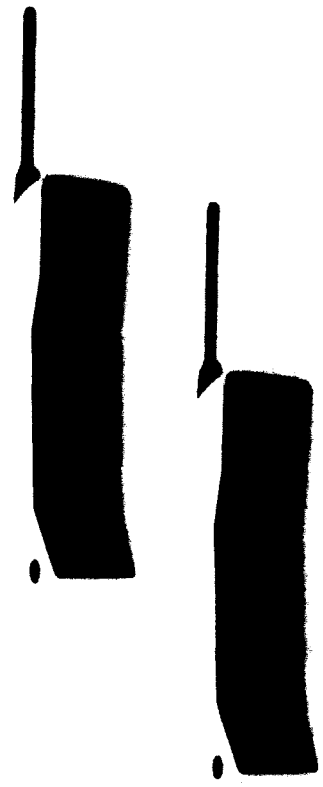
Tumbling Fraud Period (1989-1992)

2.7 Million Subscribers

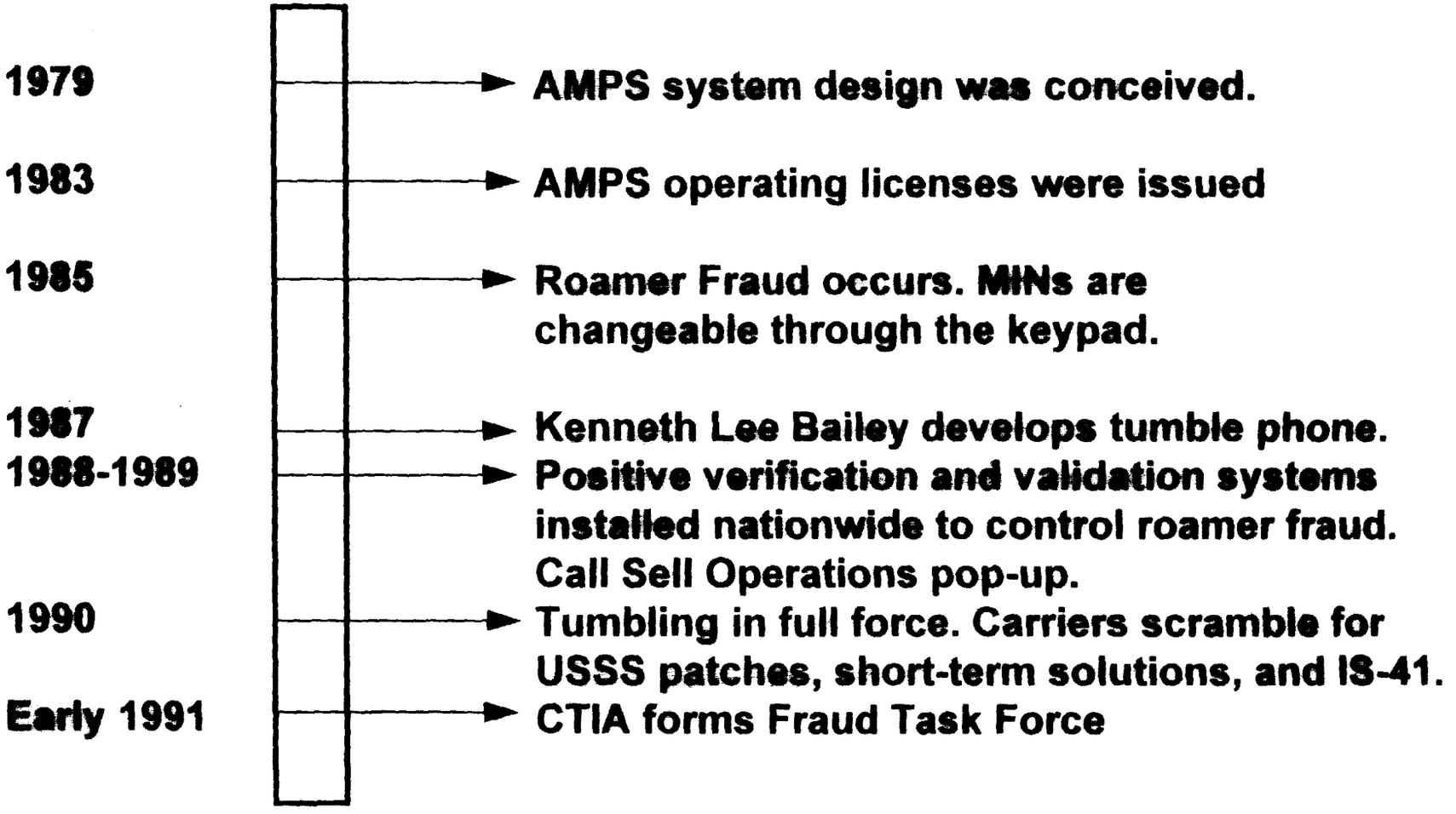
11 Million Subscribers

Cloning Fraud Period (1992-200?)

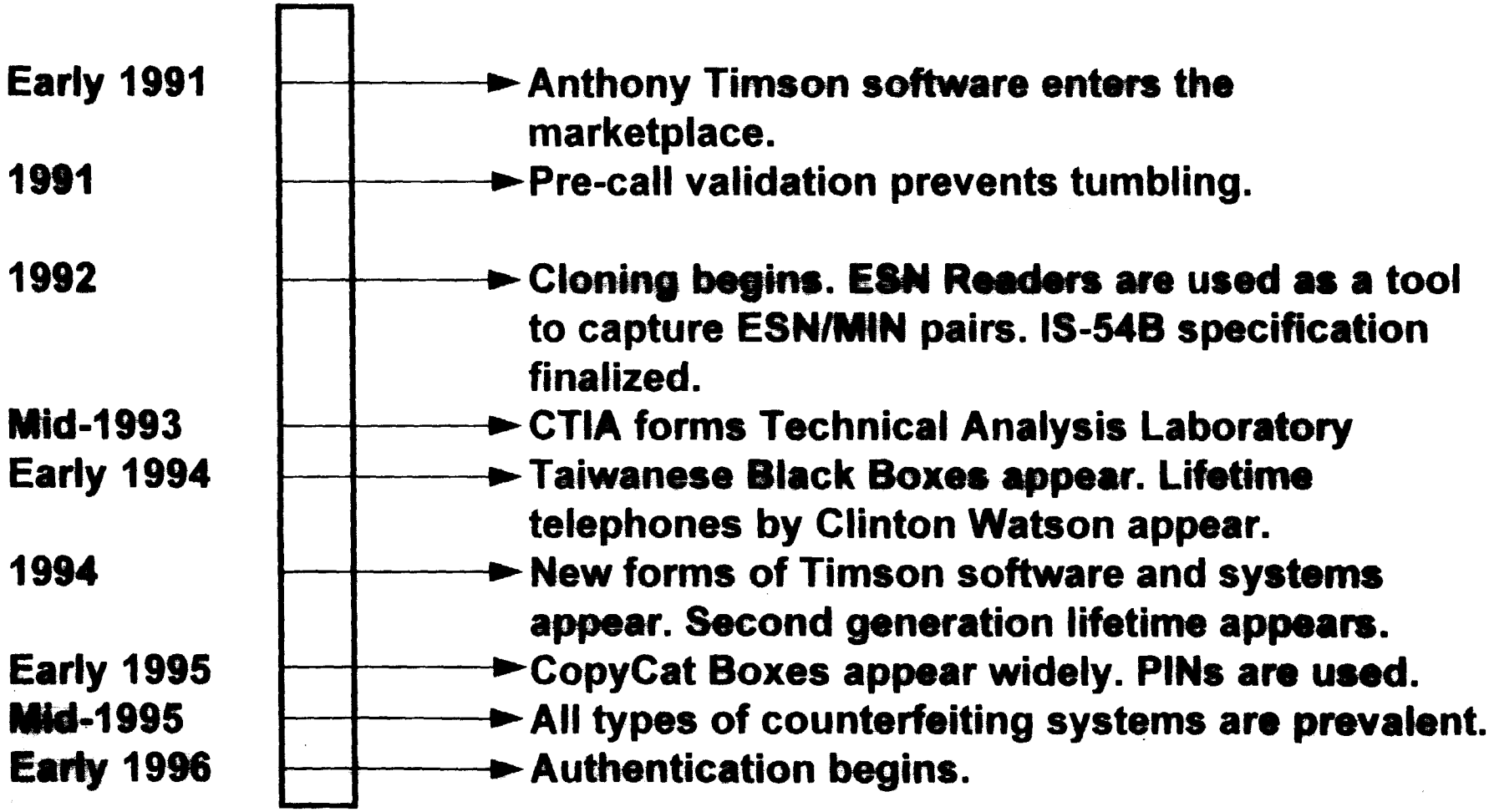
1996: 33 Million Subscribers

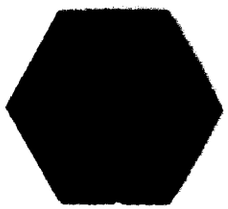


History of Cellular Fraud in North America



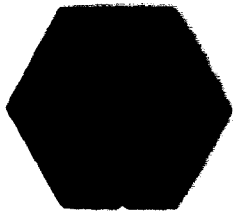
History of Cellular Fraud in North America (continued)





Facts Regarding Cellular Fraud

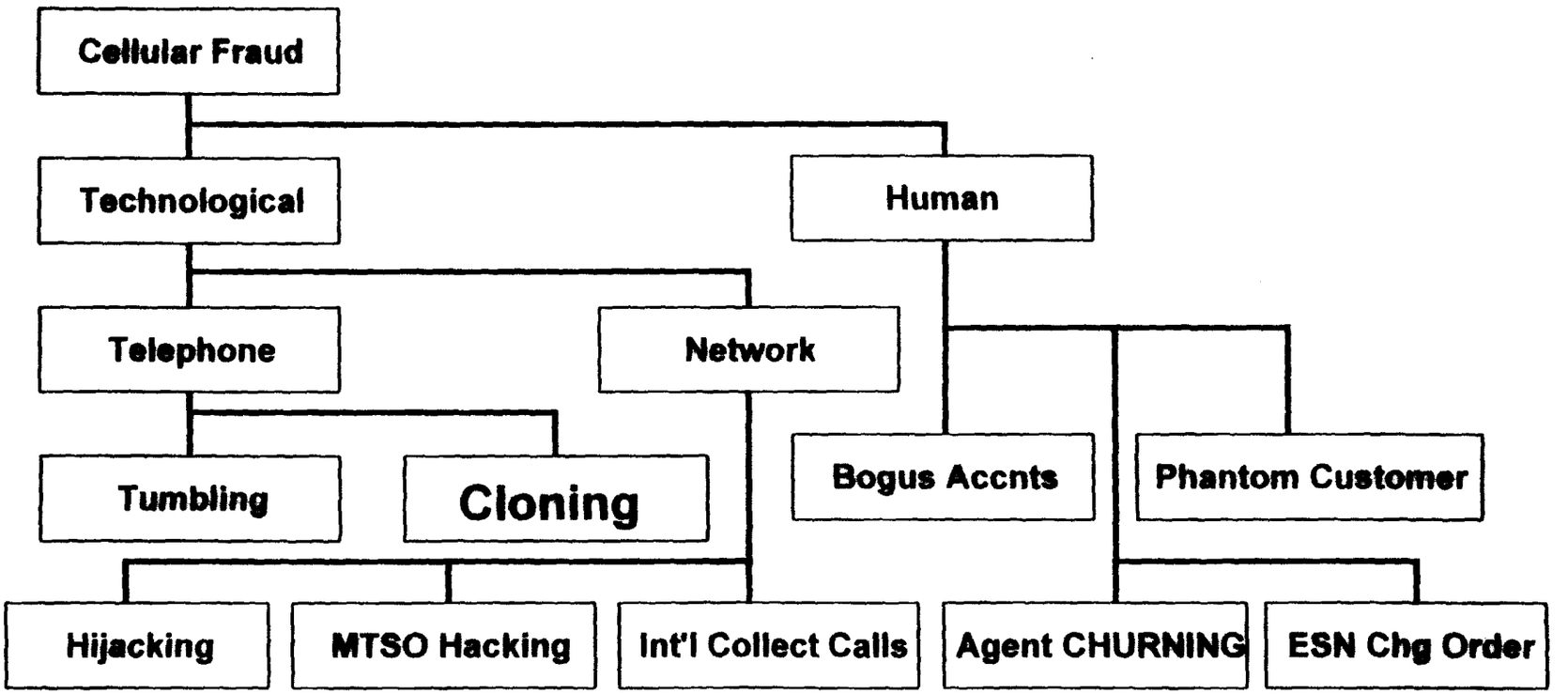
- Fraud will never go away completely
- Typically associated with other criminal activities (gambling, racketering, drug dealing, etc.)
- Existing antifraud tools will ultimately have minimal impact
- Heightened awareness will work for/against problem
- Weakness of single link may compromise whole system



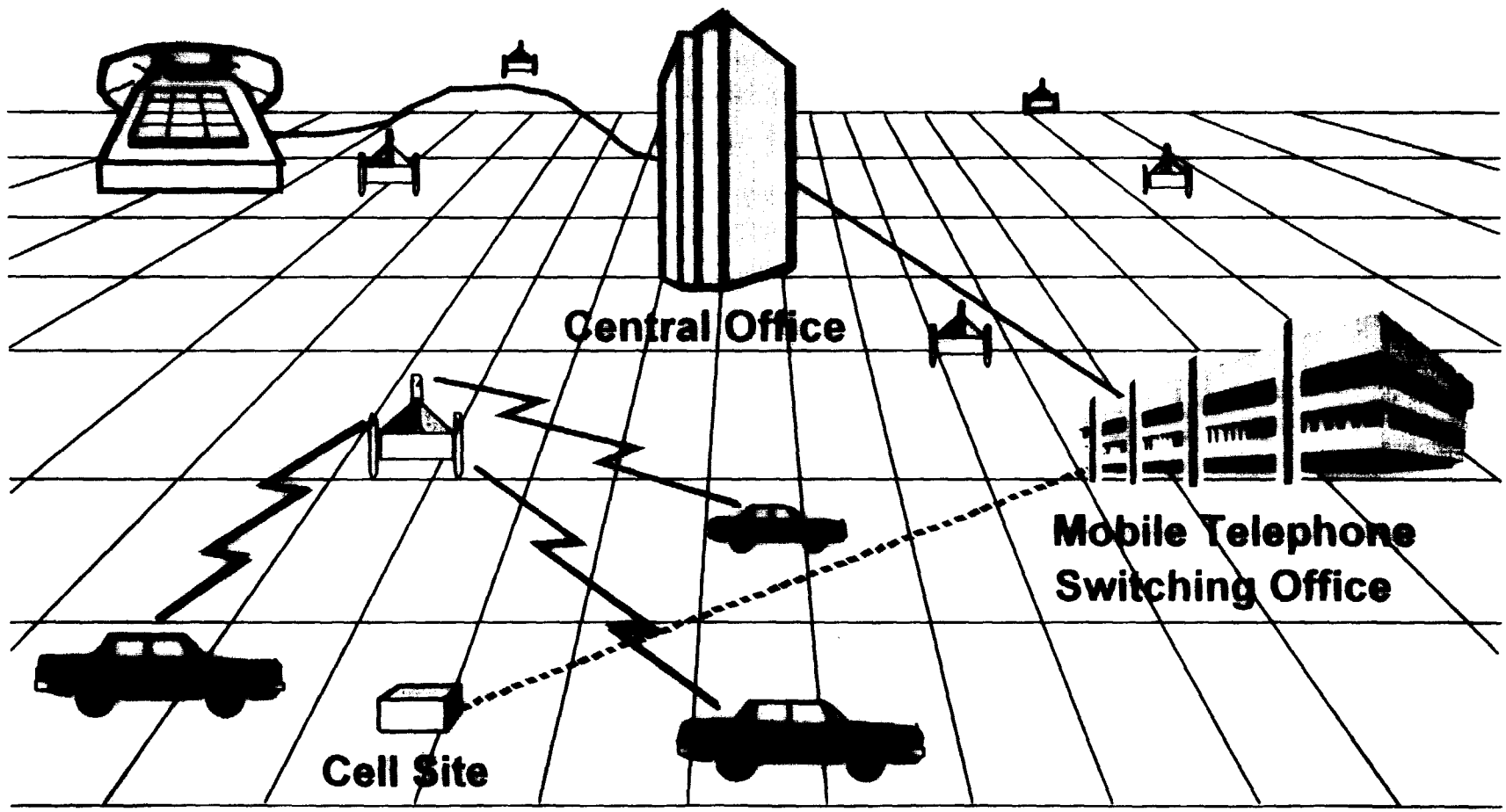
More Disturbing Cellular Fraud Trends

- Fraud will get significantly worse in the near term
- "Honest" people are committing fraud
- Cellular bandits have plenty of money and resources
- "Cellphone phreaking" concepts are shared
- Bandits are getting more technically sophisticated
- Software "tools" are becoming more readily available with Information Superhighway access

General Taxonomy of Cellular Fraud

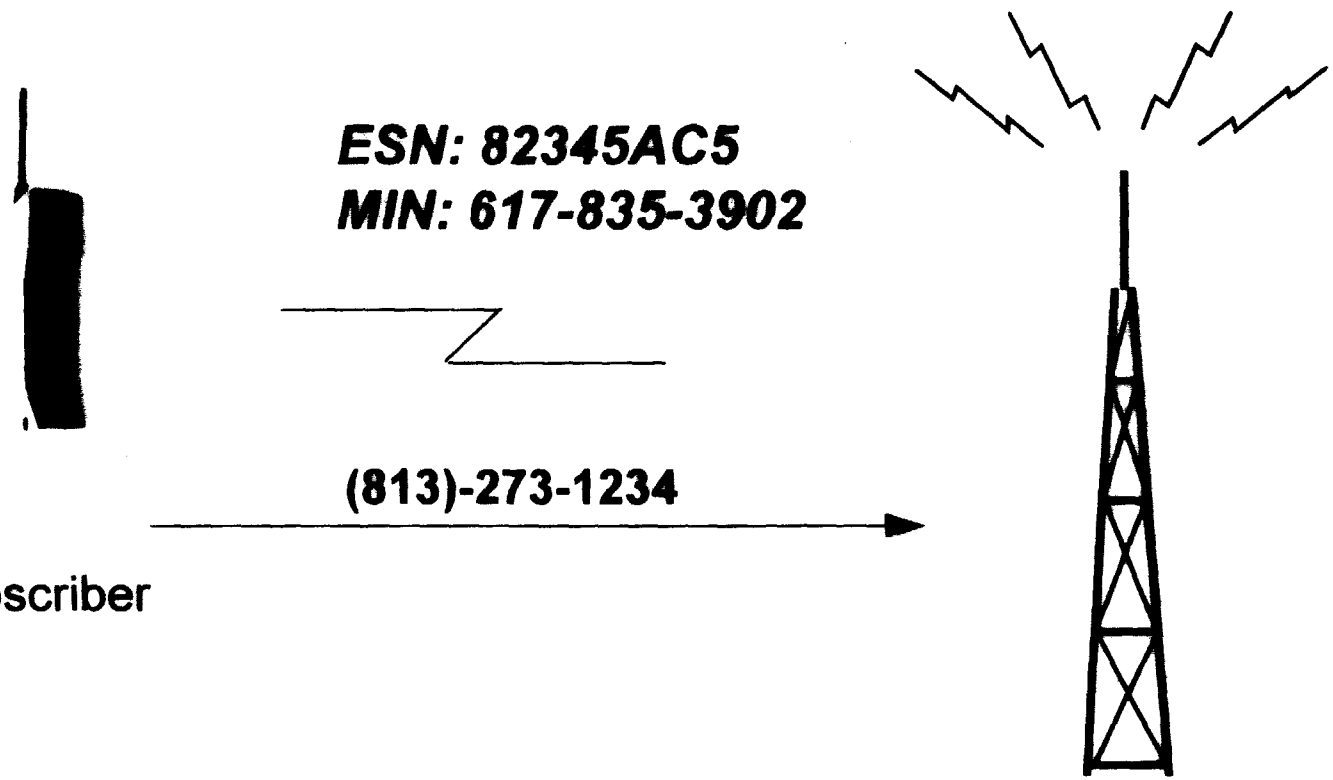


Principle of Cellular Telephony



Typical Cellular Call – No validation

Wireless Interface (Radio Path)



Cloning: The Approach